

SHORT COMMUNICATION

New spider host associations for three acrocerid fly species (Diptera, Acroceridae)

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Abstract. Acrocerid flies are endoparasitoids of spiders. New host associations are reported for *Ogcodes melampus* Loew 1872, *O. eugonatus* Loew 1872, and *Acrocera* sp. (Group IV; *sensu* Sabrosky 1944) from reared individuals of two Salticidae species, *Pelegrina proterva* (Walckenaer 1837) (both *Ogcodes* species), and *Eris militaris* (Hentz 1845) (the *Acrocera* sp.) (Group IV; *sensu* Sabrosky 1944). The spiders were sampled in the canopy and understorey of a mature north-temperate hardwood forest at the Morgan Arboretum, Québec, Canada.

Keywords: Endoparasitoids, Salticidae, canopy, maple, beech

Acrocerid flies (Diptera, Brachycera) are endoparasitoids of spiders. Each larval instar is morphologically unique and has a distinctive lifestyle (hypermetamorphosis: Schlinger 1987). Their planidial first instar larvae actively seek their spider host or, only in the genus *Acrocera*, attach themselves to the substrate where they have hatched, waiting for a host spider to pass by (Schlinger 1987, 2003; Nielsen et al. 1999). Once a host is found, the planidium climbs on to the spider, migrates to the spider's abdomen, and cuts a small hole to enter the spider en route to the booklungs (Schlinger 1987; see Nielsen et al. 1999, for an alternative strategy to enter the host). In the booklungs, the larva molts again, attaches itself to a booklung, and enters a resting stage. After molting, the fourth instar larva feeds actively inside the spider and causes the parasitized spider to spin a molting-web like retreat. The acrocerid larva then emerges from the spider, finishes feeding, fixes itself to the web and pupates (Schlinger 1987). Acrocerid flies show a preference for wandering, fossorial, and web-building spiders that live close to the ground and wander in adjacent vegetation (Cady et al. 1993).

We report new spider (Araneae) host associations for *Ogcodes melampus* Loew 1872, *O. eugonatus* Loew 1872, and *Acrocera* sp. (Group IV; *sensu* Sabrosky 1944) (Diptera: Acroceridae). Foliage spiders were sampled by beating live and dead branches between 10 May and 24 September 2007 in the canopy of mature trees and understorey saplings of sugar maple (*Acer saccharum* Marsh.) and American beech (*Fagus grandifolia* Eher.) at the Morgan Arboretum, Sainte-Anne-de-Bellevue, Québec, Canada (45°25'55"N; 73°56'58"W). In the laboratory, the spiders were housed individually in small plastic containers and kept alive in preparation for a ballooning dispersal experiment.

During this experiment, cream yellow pupae were noticed inside containers of three, dead, sub-adult individuals of *Pelegrina proterva* (Walckenaer 1837) (Araneae: Salticidae, body size = 3.9 mm, $n = 4$). Two of these individuals of *P. proterva* were sampled in the canopy of mature American beech trees and one in the canopy of a mature sugar maple on 7 June 2007. Adult flies emerged in the plastic containers approximately 28 days later, in early July 2007. The adults were determined to be two females of *O. eugonatus* (one from American beech and the other from sugar maple) and one female of *O. melampus* (from American beech).

In similar fashion, a female *Acrocera* sp. (Group IV, near female I *sensu* Sabrosky 1948) emerged from a sub adult individual of *Eris militaris* (Hentz 1845) (Araneae: Salticidae, body size = 5.2 mm, $n = 6$). This individual of *E. militaris* was sampled on an American beech sapling in the understorey on 3 July 2007, the acrocerid larva had pupated a week later, and the adult fly emerged approximately 2 wk

later. Overall, 0.88 percent of the spiders in our study were parasitized by Acroceridae.

Acrocera is known to lay its eggs on grass stems (Schlinger 1987), potentially not far removed from American beech saplings. *Eris militaris*, the host spider, is also significantly associated with the understorey layer in this habitat type (Larrivée & Buddle 2008). In contrast, the three infected individuals of *P. proterva* originated from the canopy. Females from the genus *Ogcodes* lay their eggs on the tips of dead twigs (Schlinger 1987), common in the canopy of beech trees. Only four acrocerid parasites were found in our study but the rarity of these flies makes this an important life history observation. *Ogcodes* specimens were only in spiders from the canopy and the *Acrocera* specimen in an understorey spider. Future research on hardwood forest *Ogcodes* and *Acrocera* species should test their potential preference for canopy and understorey spiders respectively.

Ogcodes melampus is mainly found in the western part of North America with previous records placing it as far east as Minnesota (Schlinger 1960). This specimen represents a significant range extension for this species. Other northeastern specimens of *O. melampus* were found in the Canadian National Collection in Ottawa, from both Michigan and Ontario. There is no life history available for this species (Schlinger 1960) and it has been reared from only two spider species, a lycosid and a thomisid (Schlinger 1987). Our record adds the family Salticidae and the species *P. proterva* to its host list. *Ogcodes eugonatus* has been reared from Lycosidae, Oxyopidae, Thomisidae, and Salticidae (species are listed in Schlinger 1987) though this is the first record of this species from a *P. proterva* host.

The genus *Acrocera* occurs across North America though records from *Acrocera* Group IV (*sensu* Sabrosky 1944) mostly originate from eastern North America. They are known endoparasitoids of seven spider families: Plectreuridae, Lycosidae, Agelenidae, Amaurobiidae, Clubionidae, Gnaphosidae, and Salticidae (Schlinger 1987). *Acrocera bulla* Westwood, a member of Group IV, is the only other known species from the genus *Acrocera* that is an endoparasitoid of the family Salticidae. Our observation adds *E. militaris* to the host list of spiders for the genus *Acrocera*.

Specimens are deposited at the Lyman Entomological Museum, McGill University, Macdonald Campus, Ste-Anne-de-Bellevue, Québec, Canada.

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